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Method of and Apparatus for Applying Coating Materials

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Application January 31, 1936, Serial No. 427,925

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This invention relates to a method of and apparatus for applying particles and various forms of comminuted materials to a base member, and to the resulting product.

The principal objects of the invention are to provide a novel method and apparatus for applying particles and finely divided materials, such, for example, as flock, linters, and the like fibrous material, abrasive particles, etc. to one or more surfaces of a base member, such as a piece of sheet material; to provide means for controlling the manner and rate of application or disposition of the particles so as to obtain a uniformly coated product having predetermined characteristics; and to provide means whereby unlimited lengths of sheet material may be coated efficiently and progressively, on either or both sides, more quickly, densely, uniformly and cheaply than by any apparatus and/or method heretofore used.

Other objects of the invention are to provide a strong and flexible product having a dense, homogeneous, villous fishish simulating the appearance of either suede or a pile fabric; and to provide a finish of any desired density wherein the major portion of the fibres are disposed at substantially the same angle relative to the surface of the base sheet with their ends firmly embedded in an adhesive coating carried thereby.

Further objects relate to the construction of my apparatus and to the mode of operation of my method, and will be apparent from a consideration of the following description and accompanying drawings which exemplify different embodiments of the invention in its apparatus, product and process aspects.

In accordance with the present invention the surface (or surfaces) of the base member or article to be coated is first rendered adhesive, as for example by the application of a suitable cementitious material, such as rubber cement, wax, paraffin, glue, or the like adhesive. When thus coated the base member is passed through an electrostatic field set up between one or more pairs of oppositely charged electrodes, and during its passage through the electrostatic field the particles to be applied are carried in a uniformly dispersed formation into the field either by gravity, a current of air, or in any other suitable manner.

Preferably the particles being conveyed to the field are charged in any suitable manner with the same charge as that of the electrode projecting them against the base member, and to this end they may be passed through a metallic screen or the like member which is connected in the circuit of the projecting electrode. It will be apparent that the passage of the particles in the air current or as stated through the screen inherently serves to disintegrate the masses of the particles of the material employed. When thus

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charged, the particles, upon entering the electrostatic field, are projected against the adhesive surface of the base member more uniformly and efficiently, and with much greater force than would otherwise be possible. Furthermore, the individual particles are more effectively aligned in the direction of the lines of force of the electrostatic field and, due to the increased force with which they are projected against the surface of the base member, are more deeply and firmly embedded in the adhesive surface of the base member. Moreover, orientation of the charged particles toward the adjacent or projecting electrode is greatly minimized, if not substantially eliminated, and consequently considerable waste is eliminated and the efficiency of the method and apparatus is appreciably increased.

The construction and arrangement of the electrodes is such as to provide an electrostatic field of uniform flux density which extends across the path of the surface of the article to be coated and at an angle to its path of travel. The position of the individual particles relative to the surface of the base member may be controlled and/or varied by adjusting the relative position of the electrodes so as to attain the desired direction of the lines of force of the electrostatic field relative to the surface of the base member. To this end one or both of the electrodes may be adjustably mounted so that their position relative to each other may be varied.

The electrostatic field may be produced by a suitable source of potential such as a Kenotron or the like alternating current rectifier, a static machine, mechanical rectifier, or any other source which may be susceptible to control. The potential impressed upon or across the electrodes may vary within wide ranges, depending upon the character of the material to be deposited, the desired rate of deposition, etc., and the usual types of control instrumentalities may be employed to provide an electrostatic field of the desired characteristics.

The rate of deposition or application may be so controlled as to produce a coated product of any desired density by varying the quantity of particles supplied, the rate of travel of the base member through the field, and/or the electrical characteristics of the field, i.e., the flux density, voltage across the electrodes, etc. To this end suitable means may be employed to control the rate of delivery of the particles and the rate of travel of the base member, the appropriate devices such as rheostats and various types of impedances, together with the usual indicators (ammeters, voltmeters, etc.), may be connected in the electrical circuits or circuit to provide for the adjustments necessary to attain an electrostatic field suitable for the application or deposition of the

particular type of material to be applied.

Where high potentials are employed or where the adhesive surface of the sheet material or base member contains an inflammable solvent, it is necessary to prevent "sparking" and suitable means may be employed to discharge or neutralize the static charge on the surface of the coated sheet before winding. To this end an ultra-violet light may be employed or, if desired, the coated sheet may be passed between electrodes connected to a high potential alternating current circuit, either of which is effective to discharge or neutralize any static charge carried by the coated sheet.

In the drawings:

Fig. 1 is a diagrammatic side elevation, in section, showing one embodiment of my apparatus;

Fig. 2 is a diagrammatic plan view of the apparatus shown in Fig. 1, the means for feeding the particles to be applied being omitted;

Fig. 3 is a diagrammatic side elevation, in section, showing a modified form of apparatus;

Fig. 4 is a section on line 4—4 of Fig. 3;

Fig. 5 is a schematic diagram illustrating one arrangement of the electrical connections;

Fig. 5a is a graphic representation of a pulsating current used in connection with certain forms of the apparatus herein shown;

Figs. 6 to 9, inclusive, are schematic diagrams illustrating other arrangements of the electrical connections;

Fig. 10 is a schematic diagram showing the electrical connections of a Kenotron transformer;

Fig. 11 is a fragmentary section showing a piece of fabric before the application of an adhesive coating;

Fig. 12 is a fragmentary section showing the fabric after the application of the adhesive coating;

Figs. 13 to 16, inclusive, are enlarged fragmentary sections showing different specimens of sheet material after being coated in accordance with the present invention;

Fig. 17 is a horizontal view with parts shown in section of another modified form of apparatus;

Fig. 18 is a plan view of the apparatus shown in Fig. 17; and

Figs. 19 and 20 are horizontal views, with parts shown in section, of further modified forms of apparatus.

The embodiment shown in Figs. 1 and 2 comprises a coating apparatus 10, a deposition apparatus designated by the numeral 11, and a winding mechanism 12. The coating apparatus may be of any type suitable for applying a coating of adhesive such as rubber cement, wax, glue, paraffin, or the like cementitious material to one or both surfaces of a base member or sheet material 2, and as here shown comprises a tank or trough 15 having guide rolls 16, 17, 20, 21, and 22 to conduct the sheet material through a fluid bath 23 of suitable adhesive, and squeeze rolls 24 and 25 to remove excess adhesive and distribute the coating uniformly over the surfaces of the sheet S. The temperature and fluidity of the bath 23 may be controlled in any suitable manner as by steam coils 26. The winding apparatus 12 may be of any conventional form and is here shown as comprising a guide roll 13, a winding drum 14, and a reel 15, upon which the coated sheet material is wound. Suitable means (not shown) may be provided to regulate the speed of the winding drum 15 and thus control the rate of travel of the sheet material S.

The deposition apparatus 11 comprises a box-like structure or housing preferably having uprights or walls of suitable electrical non-conducting material which define the deposition zone or chamber 30, the top of which may be open as shown in Fig. 1. The end walls 31 and 32 are provided with vertically

extending slots or openings 33 and 34, respectively, through which the sheet material S may be conducted into and out of the zone or chamber 30, and guide rolls 35, 36, 37, and 38 are provided to support the sheet S for movement along a predetermined path through the deposition zone or chamber 30.

Electrodes 40, 41, 42, and 43 are mounted in pairs, each electrode comprising an elongate metallic bar secured to a suitable support and having a series of pointed members or prongs secured thereto and arranged shown in Figure 2. The electrodes are arranged in pairs 40, 41, and 42, 43 and may be connected to any suitable source of potential as hereinafter described. The elements of each pair are disposed on opposite sides of the path of travel of the sheet S and are preferably inclined at an angle to its line of travel so as to provide an electrostatic field which extends diagonally across the path of movement of the sheet S. The purpose of this inclined arrangement is to insure a more even coating when the comminuted material is fed to the electrostatic field from the top.

Suitable means are provided to conduct the material to be deposited on the sheet S into the electrostatic fields set up between each pair of electrodes and to this end hoppers 50 and 51 may be arranged directly above electrodes 40, 41 and 42, 43, respectively. If it be desired to coat one side of the sheet S only, the hoppers may be arranged to discharge the coating material into a zone between the projecting electrode and surface of the sheet to which the material is to be applied. Where both sides of the sheet S are to be coated, the hoppers may be arranged to discharge the particles on both sides of the sheet S or, if desired, one hopper may be arranged to discharge the material on one side of the sheet and the other hopper on the opposite side, the particular arrangement depending upon the connections of the electrodes for the most effective results.

At some convenient location between the hoppers 50, 51 and the electrostatic fields, there may be provided means for imparting an electrostatic charge to the particles to be applied and to this end metallic screens 52 and 53, or the like, may be mounted beneath the discharge openings of the hoppers 50 and 51, as shown in Fig. 1, or, if desired, these screens may be integral with the hoppers. Each of the screens are connected to the negative electrode or to the negative terminal of a suitable source of potential so that the particles as they emerge from the screen have the same negative charge as that of the negative or projecting electrode. Suitable means (not shown) may be employed to control the rate of delivery of the particles from the hopper so that the density of the coating applied to the sheet material may be varied as desired.

The embodiment shown in Figs. 3 and 4 is a preferred form or deposition apparatus and includes all the essential elements of the apparatus shown in the previously described embodiment. In this embodiment the side and end walls of the deposition chamber have been dispensed with and uprights 46 are provided to support an insulating top plate 47 on which the hoppers 50 and 51 and the screens 52 and 53 are mounted. The electrodes 40, 41, 42, and 43 are supported on uprights 48 which are mounted on the base of the apparatus or they may be suspended from the top plate. Suitable means (not shown) may be provided to guide the sheet S between each pair of electrodes as in the previously described embodiment.

In Figs. 5 to 9, inclusive, I have shown various ways in which the electrodes may be connected for use with a pulsating current (graphically represented in Fig. 5a) such as may be derived from a two-tube Kenotron rectifier, or a continuous (non-pulsating)

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current such as may be derived from a static machine, mechanical rectifier with a suitable condenser, a high voltage generator, or the like, the arrangement shown in Figs. 6 to 9 being particularly suitable for use with a pulsating current.

In the arrangement shown in Fig. 5, the electrodes 40 and 43 are connected to each other by a conductor 55 and by a conductor 56 to a suitable source of potential, here shown as a Kenotron rectifier designated generally by the numeral 60. The electrodes 41 and 42 are connected to each other by a conductor 57 and to the ground by a conductor 58. With this arrangement the conductors 55 and 56 are preferably connected to the negative terminal of the Kenotron 60 or other source of potential and its positive terminal may be grounded by means of conductor 59 or connected to the positive terminal of the source of potential, as desired. When thus connected the current flows from the Kenotron through a main circuit comprising the conductor 59, the ground and conductor 58, at which point the main circuit branches into two circuits, one of which comprises electrodes 42 and 43 and the conductor 55, the second branch circuit comprising the conductor 57 and electrodes 41 and 40. The conductor 56 connects the branch circuits to the negative terminal of the Kenotron and thus completes the main circuit from the Kenotron to the electrodes.

This arrangement is particularly suitable for use when both sides of the sheet S are to be coated as it will be noted that the negative or projecting electrodes 40 and 43 are on opposite sides of the sheet S and the intensity of the electrostatic fields established between each pair of electrodes is always the same. When this arrangement is used in conjunction with the apparatus shown in Figs. 1 and 2, the screens 52 and 53 may be connected to the electrodes 40 and 43, respectively, so that the particles discharged into the electrostatic field are first given a negative charge. The hoppers 50 and 51 and the screens 52 and 53 are preferably positioned so that the charged particles are delivered into that portion of the electrostatic field between the projecting electrode and the adjacent surface of the sheet to be coated.

In the arrangement shown in Fig. 6 electrodes 40 and 42 are connected one to the negative terminal of the Kenotron and the other to the ground or to the positive terminal of the source of potential by conductors 56 and 58, respectively, and the electrodes 41 43 are connected to each other by a heavy metallic bar 65 which provides an appreciable capacitance in the circuit between the electrodes 41 and 43. These electrodes and the bar 65 constitute, in effect, a unit which acts as a condenser and which builds up its charge as the potential increases from zero to maximum and discharges through the electrodes 41 and 43 as the potential drops from maximum to zero (Fig. 5a). In place of the bar 65, the alternative arrangement shown in Fig. 7 may be used, in which case the electrodes 41 and 43 are connected to each other by a conductor 62 which is connected to one terminal of a condenser 63, the other terminal of the condenser being grounded. With either of these arrangements the flow of current through the circuit as the potential increases from zero to maximum is from electrode 42 to 43 and from electrode 41 to 40, the electrodes 41 and 42 being positively charged and electrodes 40 and 43 being negatively charged. When the potential reaches a maximum the electrodes 41 43 become fully charged so that when the potential drops from maximum to zero, there is a discharge from electrodes 41 and 43 through electrodes 40 and 42, respectively. Either of the arrangements shown in Figs. 5, 6 and 7 may be used with the apparatus shown in Figs. 1 to 4 in coating either or both sides of the sheet S.

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The arrangement shown in Fig. 8 comprises a single pair of electrodes 40 and 41, the electrode 40 being connected to the Kenotron 60 by conductor 56, and the electrode 41 being connected to the ground or the conductor 59, as preferred, by a circuit which includes the condenser 63. This arrangement is particularly suitable where only one side of the sheet S is to be coated.

The arrangement shown in Fig. 9 is substantially the same as that shown in Fig. 7 except that instead of using two pairs of electrodes, four pairs, 40-40ª 41-41ª, etc. arranged in tandem are employed. This arrangement is particularly suitable where a much denser coating of material is to be applied.

In Fig. 10 I have shown a preferred form of electrical connections which affords an effective means of controlling the characteristics of the electrostatic field when an alternating current rectifier is used as a source of potential. The numerals 66 and 67 designate the alternating current power supply lines which are connected to the terminals of the primary windings 68 and 69 of a main transformer 70 and a filament transformer 71, respectively. Rheostats 72 and 73 are connected in the respective circuits so as to control their outputs. One terminal of the secondary winding 74 of the main transformer 70 is grounded by means of the conductor 59 (see also Figs. 5 and 9) and the other terminal is connected to the filament circuit of the rectifier or Kenotron 60, a voltmeter 75 being connected across the terminals of the primary winding 68. The filament circuit of the rectifier or Kenotron 60 is connected to the secondary 76 of the filament transformer and a voltmeter 77 may be connected across the primary 68 in the manner shown. The output terminal of the rectifier 60 is connected to the load by the conductor 56, as shown in Figs. 5 to 10. With this arrangement, the output of the rectifier may be accurately controlled by adjusting the rheostats 72 and 73 and thus the electrostatic fields set up between the electrodes may be varied so as to attain the desired strength, density, etc.

In using the apparatus shown in Figs. 1 to 4 to carry out my process, the sheet material S, such as a piece of fabric 70 (Fig. 11), is drawn from the supply roll 18, through the bath 23 where a coating 71 (Fig. 12) of adhesive such as glue, paraffin, rubber cement, wax or the like is applied to both surfaces. While the adhesive coating is still tacky the sheet is guided between each pair of electrodes, as indicated in Figs. 1 to 10. The rheostats 72 and 73 are adjusted to produce the desired potential across the electrodes and thus establish an electrostatic field of the desired strength and intensity. After having made these adjustments the material to be applied is fed from the hoppers 50 and 51 at a predetermined rate and after passing through the screens 52 and 53 where the individual particles receive a negative charge, they are then carried by gravity into the electrostatic field. When material such as flock, linters and the like fibers, as well as the various forms of abrasive material such as carborundum, pumice, tripoli, etc. constitute the coating material being applied, the individual particles upon entering the electrostatic field, due to their elongate nature, become aligned in the direction of the electrostatic lines of force and are uniformly projected or bombarded against the adhesive surface of the sheet S so that their ends are deeply and firmly embedded in the adhesive coating at substantially the same angle and their projecting portions are disposed in substantial parallelism relative to each other. Due to the initial charge imparted to the particles, they tend to repel each other and become dispersed so that upon being projected against the adhesive surface of the sheet S the individual particles are spaced relatively to

each other. As the individual particles align themselves with their major axes coinciding with the direction of the electrostatic lines of force, they may be applied to the Sheet S so that their major axes are disposed at any desired angle relative to the surface of the sheet and consequently a greater number of particles per unit area may be applied to the sheet and with greater uniformity than is otherwise possible. When thus applied, their embedded ends are held in spaced relation to each other on the sheet S by reason of capillary action and the removal of the film of air surrounding the particles the adhesive creeps up or rises along their sides forming a meniscus about the embedded ends of each individual particle.

After having received a coating of particles on one or both surfaces, sheet S is guided out of the deposition zone and passed between a pair of ultraviolet lights L and L' or other suitable means operative to discharge or neutralize the static charge carried by the coated surface without causing sparking. After removing the static charge on the sheet, it is then wound up on the reel 15. During both the coating and deposition operations the sheet S is held under slight tension by the "pull" of the winding drum and reel. The density of the coating may be varied, as desired, by varying either the rate of travel of the sheet S, the rate of delivery of the particles from the hoppers 50 and 51, or both, and the strength of the electrostatic field may be varied accordingly.

When applying fibrous material at a relatively low rate, a potential of the order of 15,000 to 25,000 volts may be used, although I prefer to use potentials from 100,000 to 500,000 volts, particularly where heavier particles are being applied or where the rate of application is to be greatly increased, the particular voltage depending upon the character of the particles, the rate of travel of the sheet, and various other operating conditions.

In Figs. 17 to 20 I have shown different modified forms of deposition apparatus particularly suitable for the application of flock, linters, asbestos fiber, wood pulp fibers, fine abrasives and the like materials, to an adhesive coated surface of a base member. In the embodiment shown in Figs. 17 and 18 the sheet material S is drawn from the supply roll 80 over a spreader roll 81 provided with a spreader blade 82 which is operative to distribute a fluid or plastic adhesive 83, such as rubber cement or the like, uniformly over the surface of the sheet S. After having received a coating of adhesive of suitable thickness, the sheet is drawn over or about a guide member which constitutes a part of the deposition apparatus. Thereafter the sheet is drawn downwardly between a pair of discharging electrodes 84, 84 connected to a suitable source of high potential alternating current, then over a guide roll 86 and wound on a reel 87, as in the previously described embodiments.

The guide member preferably comprises a plate electrode 85 interposed between two sheets of electrical non-conducting material such as Bakelite, the upper sheet or layer 88 having a smooth surface and being provided with a rounded or beveled edge as shown in Fig. 17. The negative electrode 90 is disposed opposite the end of the electrode 85 and is arranged so as to establish a field whose lines of force intersect the path of travel of the sheet S at any desired angle. Preferably the length of each electrode is sufficient to provide an electrostatic field having a width corresponding to that of the sheet S.

A supply hopper 91 is disposed above the electrostatic field and is constructed and arranged to deliver the fibrous material into a screen 92 or the like device interposed between the field and the hopper. The electrical connections are shown

schematically in Fig. 17 wherein a conductor 95 connects the screen 92 and the electrode 90 to the negative terminal of a suitable source of potential designated by the numeral 96, the positive terminal being grounded by a conductor 97 or connected to the electrode 85, as desired. The electrode 85 may be grounded by a conductor 98 or otherwise connected to the conductor 97. and suitable means such as a controller 99 and rheostat 100 may be provided to control the potential and flow of current in the circuit. If desired, a voltmeter 101 may be connected in the circuit in the usual manner. The electrodes 84, 84 when connected as shown in Fig. 17, establish an alternating electrostatic field across the path of the coated sheet and are thus effective to discharge or neutralize any static charge carried by the sheet. The operation of the apparatus is substantially the same as that of the previously described embodiments, it being understood that the present arrangement is designed to coat only one surface of the sheet S at one time.

In the embodiment shown in Fig. 19, the cementitious material is applied to the sheet S in the same manner as in the embodiment shown in Figs. 17 and 18. In place of the guide member the plate electrode shown in Figs. 17 and 18, a roller electrode 105 is used. The roller electrode provides a guide roll about which the sheet S is drawn on its way to the winding drum or reel (not shown) and may be connected to the ground or otherwise, as in the previously described embodiments. The negative electrode 107 comprises a metallic screen member which is shaped to provide a substantially horizontal portion 108 through which the particles discharged from the hopper 109 may pass, and a depending portion 110 disposed opposite but parallel to the roller electrode 105. The supply hopper 109 is disposed above the horizontal portion 108 of the negative electrode so as to discharge the particles into its horizontal portion. The negative electrode is connected to the negative terminal of the source of potential and the usual control devices may be provided as in the previously described embodiment.

The embodiment shown in Fig. 20 is somewhat similar to that shown in Figs. 17 and 19 but is particularly designated for use in applying particles to a sheet having an adhesive coating which comprises a thermoplastic cementitious material, such as wax, paraffin, etc., which must be maintained in a relatively fluid or tacky condition during the deposition operation in order that the ends of the particles may be firmly embedded therein. The apparatus embodies all the essential elements shown in Figs. 17 to 19 but in place of the electrodes shown therein, a metallic block 114 and rotor 115 are used. The block 114 constitutes the positive electrode and preferably comprises a metallic casting having a series of longitudinally extending ducts or channels 116 which may be connected to a steam or hot water supply (not shown). The outer walls of the block 114 which contact with the sheet material are smooth and the adjacent corner is preferably rounded or beveled to provide a suitable guiding surface over which the sheet S is drawn. The rotor 115 consitutes the negative or projecting electrode and preferably comprises a cylindrical screen or grating supported on a circular plate which is rotatably mounted on a stationary tubular shaft 117. The tubular shaft 117 is provided with a radially disposed axially extending slot coextensive with the longitudinal extent of the screen and facing away from the electrode 114. A conduit 119 having an elongate, horizontally extending, flaring mouth or entrance 120 disposed in radial alignment with the slot 118, is disposed closely adjacent to the electrode 115, as shown, and may be connected to

a suitable suction fan or the like (not shown). A supply hopper 109 and a charging screen 111 are provided as in the embodiment shown in Fig. 17 and similar electrical connections, controls and means for discharging the static charge from the coated sheet may be employed. During the deposition operation the electrode 115 is continually rotated, compressed air being introduced into the shaft 117 and discharged through the slot 118, and the electrode 114 is maintained at a predetermined temperature by the flow of steam or hot water through the ducts 116. The force of the air striking against the screen or grating of the electrode 115 is sufficient to remove any accumulations or oriented fibrous material or other particles and carry them into the conduit 120, thus keeping the negative or projecting electrode relatively free of oriented material.

In Figs. 13 and 16, inclusive, I have shown different types of coated sheet material produced in accordance with the present invention. The products shown in Figs. 13 and 14 each comprise a base member or backing sheet 121, such as a sheet of heavy paper, a layer 122 of glue or the like binder, and a coating of abrasive particles 123 which have their ends deeply embedded in the binder 122. It will be noted that the individual particles are more or less elongated in character and are disposed with their major axes substantially at right angles to the surface of the backing sheet, and that their free ends, being disposed in substantial parallelism relative to each other, present a most effective cutting or abrading surface.

The product shown in Fig. 15 comprises a backing sheet 125, such as a sheet of fabric, a layer 126 of rubber cement or the like soft or flexible binder, and a coating 127 of fibrous material such as cotton flock or linters. It will be noted that the ends of the individual fibers are deeply embedded in the cementitious layer 126 and are disposed in uniformly spaced relation with their body portions extending outwardly in substantial parallelism, thus presenting an appearance which simulates that of a pile fabric.

The embodiment shown in Fig. 16 is similar to that shown in Fig. 15 except that the backing sheet consists of a sheet of heavy paper 128 and the fibers of the coating 127 are disposed at an angle 45° to 60° relative to the backing sheet 128, thus presenting an appearance resembling suede.

The products shown in Figs. 15 and 16 are greatly superior to those made in accordance with the prior practices wherein the fibrous material is deposited on an adhesive surface of a backing sheet by means of a current of air or by gravity. In such products the individual fibers are heterogeneously disposed on the surface of the adhesive and hence do not assume any definite position relative to each other. Consequently, such products do not possess the dense and uniform characteristics nor the attractive appearance or finish of those made in accordance with the present invention. Moreover, the wearing qualities of such products are greatly inferior to those made in accordance with the present invention due to the fact that the individual particles are not embedded to a sufficient extent, if at all, in the adhesive, and as the body portions and the ends of the individual fibers provide the surface of the product, the individual fibers are soon worn away or are easily dislodged from the adhesive and hence expose uncoated areas of the binder. In the products made in accordance with the present invention the individual fibers, being firmly embedded in the adhesive are not easily dislodged and as their ends constitute the major portion of the surface of the product, they effectively resist wearing. Furthermore, due to the fact that a much denser coating may be applied to the adhesive surface of the backing sheet, there is a greater number of fibers per unit area to resist wearing and abrasion, and consequently my product will outwear those made in accordance with the prior practices.

While I have shown and described different desirable embodiments of the present invention, it is to be understood that this disclosure is for the purpose of illustration only and that various changes and modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

Having regard to the foregoing disclosure, the patent of which this specification forms part confers, subject to the conditions prescribed in The Patent Act, 1935, the exclusive right, privilege and liberty of making, constructing, using and vending to others to be used, the invention as defined in claims submitted by the patentee as follows:

1. The process of coating to provide a suede-like surface which includes as steps thereof feeding a carrier or backing and applying an adhesive layer to a surface thereof, and depositing on said adhesive layer particles of finely divided fibrous material under the influence of an electrical field whose lines of force are directed so as to orient the particles with their major axes at an angle of from about 45 to 60° with respect to the backing, attaching the ends of said particles to said adhesive layer and leaving the opposite ends free, thereby forming the suede-like surface for said carrier or backing.

2. The process of forming suede-like surfaces which includes as steps thereof feeding a carrier or backing and applying an adhesive layer to a surface thereof, and depositing on said adhesive layer particles of flock under the influence of an electrical field whose lines of force are directed so as to orient the particles with their major axes at an angle of from about 45 to 60° with respect to the backing, attaching the ends of said particles to said adhesive layer and leaving the opposite ends free, thereby forming the suede-like surface for said carrier or backing.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P., Queen's Printer and Controller of Stationery, Ottawa, 1957

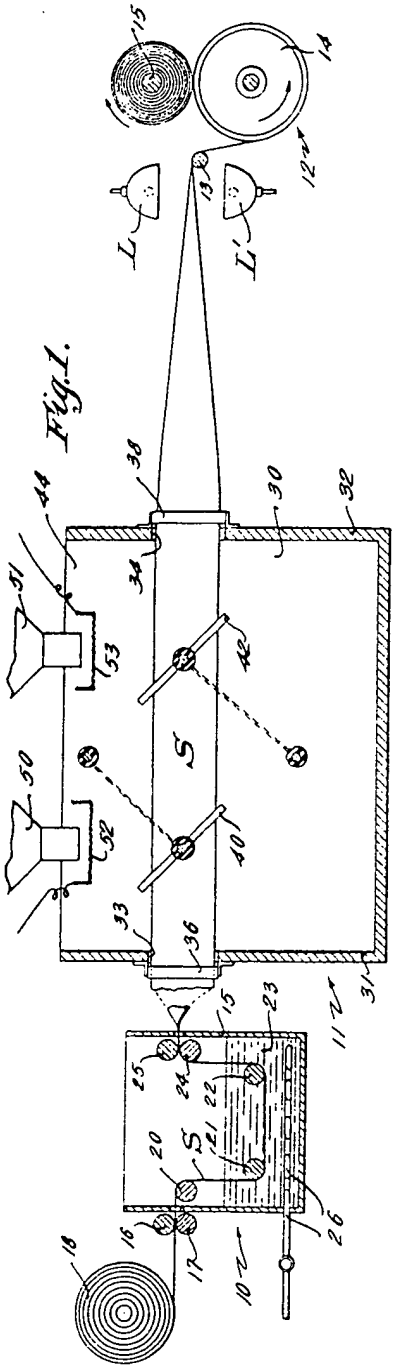


Fig. 1.

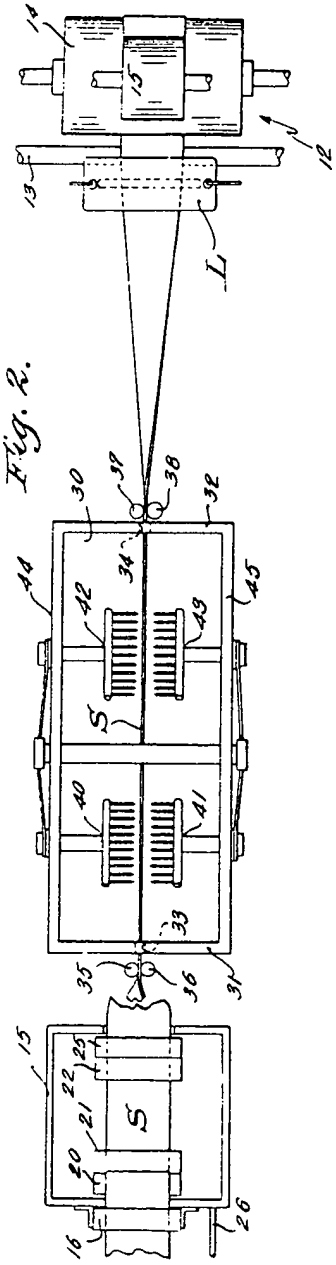


Fig. 2.

Fig. 3.

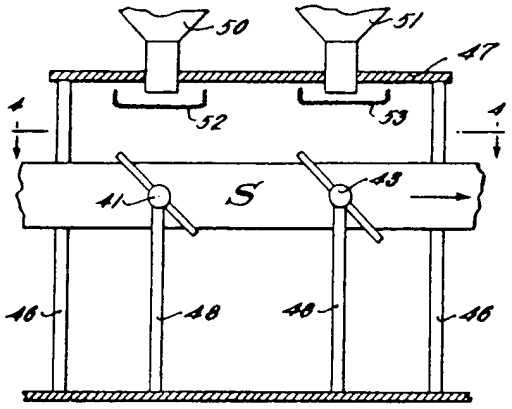


Fig. 5.

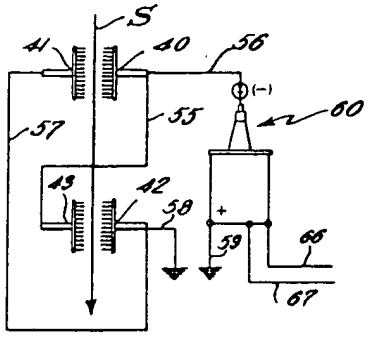


Fig. 5a.

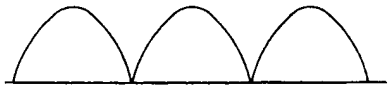


Fig. 4.

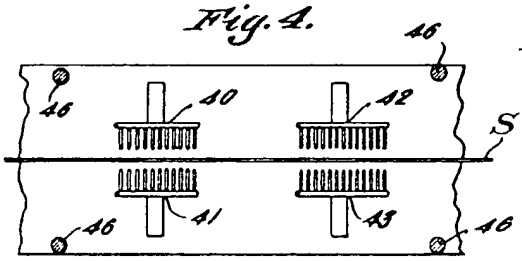


Fig. 6.

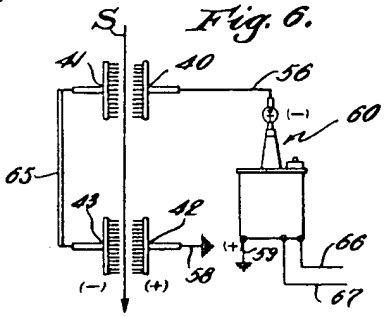


Fig. 7

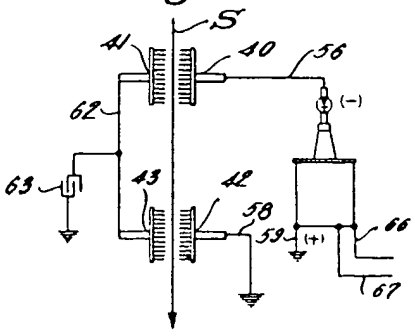


Fig. 8.

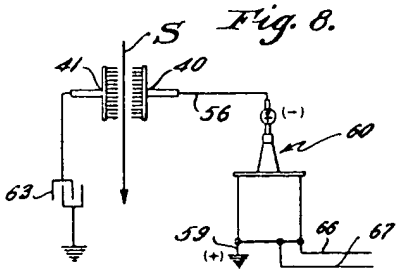


Fig. 9.

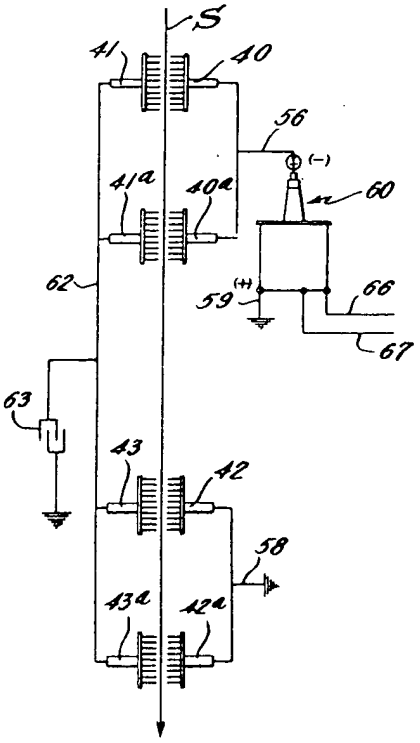
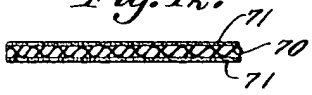


Fig. 11.

Fig. 12.



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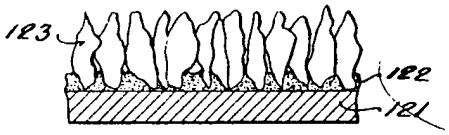

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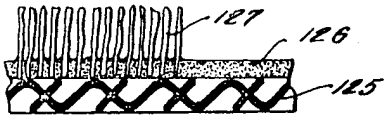


Fig. 14.

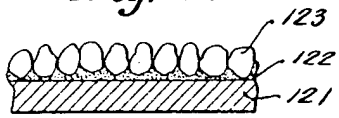


Fig. 16.

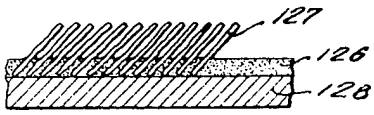
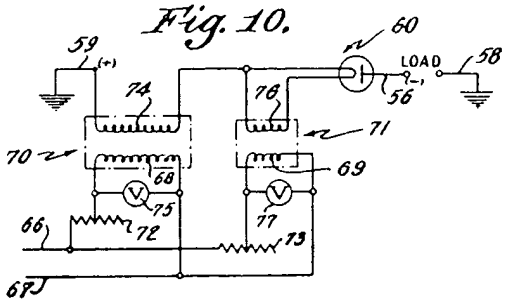


Fig. 10.



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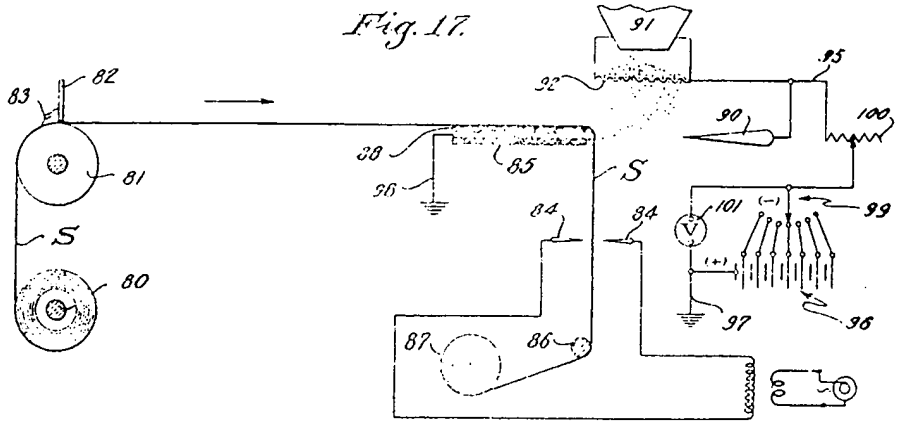

Fig. 18.

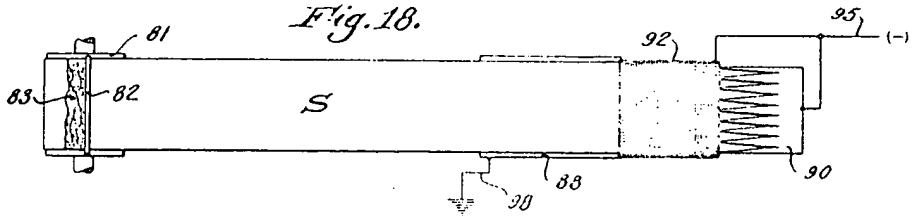

Fig. 19.

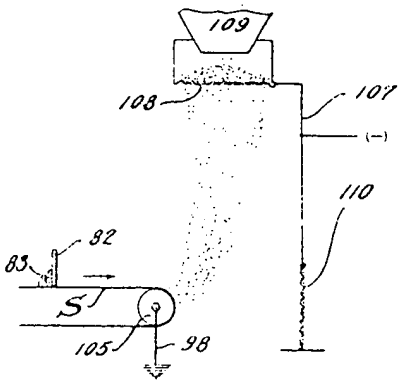

Fig. 20.